

Our Space,  
Your Rocket

The Aerospace  
Industry in  
New Mexico



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## INTRODUCTION

New Mexico is home to three national research laboratories, each of which conducts R&D for the space industry; three Air Force bases; and three aerospace testing facilities with access to the restricted air space in southern New Mexico. These institutions have played an integral role in establishing an infrastructure that is conducive to growth ranging from avionics to manufacturing.

There are many reasons why the world's premier aerospace companies do business in New Mexico.

- Ideal flying weather - 310 days of sunshine per year means minimal delays due to weather conditions, and the combination of high altitude and dry air lowers fuel costs and lessens conditions for corrosion
- Superior launch opportunity - low air traffic and restricted airspace adjacent to White Sands Missile Range
- Land - New Mexico is the fifth largest state geographically with a very low population density of only 17 persons per square mile
- People - The 2014 State New Economy Index ranked our workforce first in manufacturing value added and the state's Job Training Incentive Program is ranked 5th in the nation (Business Facilities)
- Track record - Robert Goddard, Wernher von Braun, and NASA all chose New Mexico to conduct their research
- Friendly Tax Climate - New Mexico has the lowest property tax in the nation, no inventory tax, and offers many incentives for new jobs and investment - three of which are specific to the industry







## SPACEPORT AMERICA (SA)

Spaceport America is owned by the State of New Mexico and is the world's first purpose-built commercial spaceport. Virgin Galactic has entered into a 20 year lease to locate its world headquarters at Spaceport America and launch its space tourism program. The Spaceport Operations Center is a 14,000 square foot dome structure that houses the Spaceport offices, support contractor offices, and emergency response personnel and equipment. The Spaceport runway is 12,000 feet by 200 feet in the 16-34 orientation. The concrete surface is designed to accommodate all classes of aircraft including wide body commercial aircraft. Spaceport America is also used by numerous private companies and scientific and engineering research programs. Currently there are a number of entrepreneurs developing and flying both vertical and horizontal launch vehicles towards exploring commercial space travel opportunities. In addition to Virgin Galactic, past and present Spaceport America clients have included Lockheed Martin, Boeing, Moog-FTS, UP Aerospace, Microgravity Enterprises, Armadillo Aerospace, and Celestis.

[www.spaceportamerica.com](http://www.spaceportamerica.com)

## COMPETITIVE TAX CLIMATE

### Consumables Gross Receipts Tax Deduction for Manufacturers

In 2012 Governor Martinez signed into law an expansion to the deduction for the sale of tangible personal property to manufacturers. A seller may deduct receipts from sales to a manufacturer of tangible personal property that becomes an ingredient or component part of a manufactured product.

The deduction is phased in as follows:

- 20% of receipts received in calendar 2013
- 40% in 2014
- 60% in 2015
- 80% in 2016
- 100% of receipts after January 1, 2017

For the purposes of this deduction, “consumable” is defined as tangible personal property that is incorporated into, destroyed, depleted, or transformed in the process of manufacturing a product, including electricity, fuels, water, manufacturing aids and supplies, chemicals, gases, repair parts, spares, and other tangibles used to manufacture a product.

### Investment Tax Credit for Manufacturers

Manufacturers may take a credit against gross receipts, compensating or withholding taxes equal to 5.125% of the value of qualified equipment imported and put into use in a manufacturing plant in New Mexico, provided the manufacturer meets the criteria of hiring additional workers to earn the credit, as follows:

- For every \$500,000 of equipment, 1 employee must be added up to \$30 million
- For amounts exceeding \$30 million, 1 employee must be added for each \$1 million of equipment

The credit may (also) be claimed for equipment acquired under an industrial revenue bond. This is a double benefit because no gross receipts or compensating tax was paid on the purchase or importation of the equipment. The manufacturer simply reduces its tax payment to the state (by as much as 85% per reporting period) until the amount of the investment credit is exhausted. There are also provisions for issuing a refund when the credit balance falls under \$500,000. The credit does not apply against local gross receipts taxes.

### High Wage Jobs Tax Credit

A taxpayer who is an eligible employer may apply for and receive a tax credit for each new high-wage economic-base job. The credit amount equals 10% of the wages and benefits paid for each new economic-base job created.

Qualified jobs:

- Pays at least \$40,000/year in rural areas
- Pays at least \$60,000/year in urban areas
- Occupied for at least 48 weeks by the employee

Governor Susana Martinez signed House Bill 14 which eliminated the gross receipts tax on maintenance services and parts on aircraft. House Bill 14 extended the existing gross receipts tax deduction for aircraft manufacturers to all providers of aircraft parts and labor services.

New Mexico has three tax incentives specific to the aerospace industry:

#### Aircraft Deduction

- Receipts from selling aircraft parts or maintenance services for aircraft or aircraft parts
- Receipts of an aircraft manufacturer from selling aircraft flight support, pilot training, or maintenance training services
- Receipts from the sale of or from maintaining, refurbishing, remodeling, or otherwise modifying a commercial or military carrier over 10,000 pounds gross landing weight
- 50% of gross receipts from selling other aircraft
- 55% of the receipts from selling jet fuel for use in turbo-prop or jet engines until June 30, 2017; 40% after June 30, 2017

#### Space Gross Receipts Tax Deductions

There are four separate deductions connected with the operation of a spaceport in New Mexico.

- Receipts from launching, operating, or recovering space vehicles or payloads
- Receipts from preparing a payload in New Mexico
- Receipts from operating a spaceport in New Mexico
- Receipts from the provision of research, development, testing, and evaluation services for the United States Air Force Operationally Responsive Space Program

#### Military Acquisition Program Tax Deduction

Receipts from transformational acquisition programs performing research and development, testing, and evaluation at New Mexico major range and test facility bases pursuant to contracts entered into with the U. S. Department of Defense may be deducted from gross receipts.



Qualified employers:

- Made more than 50% of its sales to persons outside New Mexico during the most recent 12 months of the employer’s modified combined tax liability reporting periods ending prior to claiming this credit
- Are eligible for the Job Training Incentive Program
- Are growing with employment greater than the previous year

Qualified employers can take the credit for four years. The credit may only be claimed for up to one year after the end of the four qualifying periods. The credit can be applied to the state portion of the gross receipts tax, compensating tax, and withholding tax. Any excess credit will be refunded to the taxpayer. The credit shall not exceed \$12,000 per year, per job.

Qualified employees:

- Must be a resident of New Mexico
- Cannot be a relative of the employer or own more than 50% of the company

Single Sales Factor

On January 1, 2014 New Mexico began phasing in a single sales factor apportionment methodology for corporations whose principal business activity is manufacturing. For the purposes of apportioning income, “manufacturing” excludes construction, farming, power generation, and processing natural resources including hydrocarbons.

Five-Year Policy Changes	
YEAR	APPORTIONMENT
2014	Double-Weighted Sales
2015	Triple-Weighted Sales
2016	70% Sales
2017	80% Sales
2018	Single Sales Factor









TEST FACILITIES

New Mexico State University Physical Science Laboratory (PSL), Las Cruces

The Physical Science Laboratory (PSL) at New Mexico State University (NMSU) is a world-recognized leader in sub-orbital platforms, information modeling for predictive decision making, specialized intelligence community support, advanced NASA scientific exploration and experimentation, homeland security sensing and detection technologies, and advanced weapons and countermeasures development and testing. PSL's resources include the Aircraft Systems (UAS) Flight Test Center (FTC), the Environmental Test Facility, and the Propulsion Test Laboratory.

NMSU's UAS FTC is the first, most accomplished and most experienced FAA-approved UAS test facility in the nation. It also provides direct access to more than 15,000 square miles of airspace, and is the only civil UAS test facility that provides direct, available access to restricted airspace – a must for testing developmental aircraft or multi-aircraft scenarios.

The UAS FTC specializes in UAS flight testing, crew training, and UAS demonstrations. It is currently the one location for which government, manufacturers, and civil entities can test their unmanned aircraft. PSL conducts an airworthiness assessment prior to any flight operations, and the process is accepted and overseen by the FAA. The UAS FTC specializes in unmanned systems flight testing and provides the capability to test several classes of UAS in a common area. The test center can accommodate any UAS size, platform or application and operates under an FAA Certificate of Authorization (CoA) that permits UAS flights in over 15,000 square miles of coordinated airspace in southeastern New Mexico. UAS operators can access the airspace from several airports located within the lateral boundaries of the operating area, including Las Cruces (LRU), Lordsburg (SLB), Hatch (E05), Grant County (SVC), and Socorro (ONM). Additionally, the FAA recently authorized NMSU to conduct research flights below 200 feet anywhere in the National Airspace System.

UAS FTC processes provide rapid airspace access. The UAS FTC follows FAA-approved procedures that allow federal and civilian UAS manufacturers and operators an alternative to CoA and experimental aircraft certification processes. The time from initial inquiry to first flight can be a matter

of weeks. The cost per flight hour at the UAS FTC provides the best value for all users. Flexible scheduling practices and vast airspace allow the UAS FTC to accommodate a wide range of UAS operations.

NMSU/PSL is a core member-university on a team that will operate a new Federal Aviation Administration National Center of Excellence for Unmanned Aircraft Systems.

On May 8, 2015, the FAA announced that the Alliance for System Safety of UAS through Research Excellence (ASSURE) would operate the new center. NMSU/PSL, as a core university of ASSURE, is helping lead the partnership of academic and industry members that will begin a new era of commercial unmanned aircraft research, development and integration into the nation's airspace.

The center of excellence research areas will include: detect and avoid technology; low-altitude operations safety; control and communications; spectrum management; human factors; compatibility with air traffic control operations; and training and certification of UAS pilots and other crewmembers.

ASSURE will form teams between its member universities, government agencies and industry partners to address both government and commercial UAS challenges.





PSL also has UAS for research and development of sensors and payloads. Their 21' and 24' wingspan Aerostar UAS provide excellent platforms for sensor development and flight testing. The Aerostar can handle up to 100 lbs. In addition to the Aerostar UAS, PSL has several other smaller UAS for R&D testing. Also available are several surrogate UAS platforms (manned) which can carry and test payloads and sensors; PSL flight operations personnel are experienced in defining test plans and methodologies for all of these test operations.

The Physical Science Laboratory's Environmental Test Facility has comprehensive UAS component testing capabilities, and assists the FAA in developing certification standards for the UAS industry. As the industry moves toward safe integration of UAS into the National Airspace System (NAS), the establishment of FAA standards for UAS components becomes more important. Therefore, the facility has been established to assist UAS manufacturers in assessing the operational suitability of various UAS components. PSL personnel have a long history of component quality assurance in aerospace and defense programs.

The Environmental Test Facility is equipped with an anechoic chamber with complete radio frequency testing capabilities for a broad range of applications and is ideally equipped to fully optimize datalink technology. The facility includes a vacuum test chamber, a thermal test chamber, and a vibration table.



The Propulsion Test Laboratory collects data for the purpose of defining operating characteristics of UAS engines, to provide data for establishing maintenance procedures and to support regulatory development for UAS engines. The laboratory operates a fully enclosed UAS propulsion test facility with digital data acquisition systems, dynamometer capacity up to 100 horsepower. Current test capabilities include:

- Engine power measurements
- Reliability testing
- Power measurements
- Long duration
- Power cycles
- Failure analysis
- Fuel consumption
- Digital data acquisition
- Maintenance requirements

<http://www.psl.nmsu.edu/>





### White Sands Missile Range (WSMR)

White Sands Missile Range provides Army, Navy, Air Force, DoD, and other customers with high quality services for experimentation, test, research, assessment, development, and training in support of the nation at war. WSMR has an extensive history for rockets, missile, UAV, and space vehicle testing and has supported testing and evaluation efforts for Apollo, Skylab, Delta Clipper, X-40, Space Shuttle, and Orion CEV projects as well as numerous military rocket and missile programs.  
<http://www.wsmr.army.mil/Pages/newhome.aspx>

The Testing Facility serves both private and governmental entities in the aerospace industry. Services and facilities include:

- Nuclear/Electromagnetic Environmental Testing
- Sensor Testing
- Weapons Testing
- Space
- System of Systems
- Counter-IED
- Flight Safety
- Ammo Handling/Storage
- Meteorology
- Unexploded Ordnance
- National Environmental Policy Act (NEPA)

WSMR owns 3,421 square miles of ground space which can be expanded to as much as 7,619 square miles through agreements with adjacent land owners. It directly controls 10,020 square miles of airspace which can be expanded to 11,130 square miles by activating restrictions.

<http://www.wsmr.army.mil/testcenter/Pages/tchome.aspx>



### NASA White Sands Test Facility (WSTF), Las Cruces

WSTF conducts simulated mission duty cycle testing to develop numerous full-scale propulsion systems. These systems have been developed for the Apollo Service Propulsion and Lunar modules, Shuttle Orbiter, and the International Space Station (ISS). Additionally, WSTF evaluates upgraded or redesigned shuttle orbiter components to extend service life, enhance performance, and improve mission safety. WSTF is formally certified to perform precision cleaning and depot-level refurbishment of flight-critical propulsion systems components.

The scientific investigation of explosion phenomena at WSTF is aimed at improving safety at launch facilities and other areas where hazardous materials are used. Ultra-highspeed instrumentation helps better define safety and structural requirements for new and existing launch facilities by measuring the effects of exploding liquid and solid propellants.

WSTF is a center of technical excellence in the fields of high-pressure oxygen systems/materials and rocket propellant safety. WSTF offers:

- Functional and performance evaluation tests
- Hazards/failure analyses of materials, components, and complete systems
- System design evaluation and recommendations
- Safety training courses and manuals

The following services are available for government and commercial customers:

#### Testing Materials and Propulsion Systems

- Ignition, flammability, odor, and offgassing
- Materials compatibility with routine or hazardous fluids
- Aerospace fluid systems and components
- Hyper- and low-velocity testing
- Solid/liquid rocket systems up to 60,000 lb thrust
- Nine rocket engine/system test stands, including six vacuum cells
- Long-duration high-altitude simulation
- Off-limits and life-cycle testing

#### Research and Development

- Burn-resistant alloy
- Blast phenomena and propellant explosion studies
- Propellant chemistry and characterization
- Spacecraft material properties
- Metals, polymers, composites

#### Technical Consultation

- Hazards/failure analyses with system design evaluation and recommendations
- Oxygen, hydrogen, propellant hydrazines, nitrogen tetroxide
- Cryogenic and hypergolic propellant handling

#### Technical Capabilities

- Chemical, physical, and metallurgical analyses
- Nondestructive evaluation techniques
- State-of-the-art analytical instrumentation
  - o Fouriertransforminfraredspectroscope
  - o Scanningelectronmicroscope
  - o Gaschromatograph/massspectrometer
  - o Microcalorimeter
- Flight component fabrication, cleaning, and refurbishment
- Instrumentation calibration to NIST standards

WSTF supports an extensive number of test programs, most of which are instrumented for temperature, pressure, load, acceleration, and other measurements. The WSTF Measurement Standards and Calibration Laboratory ensures that the instruments used to make these measurements are accurate by calibrating them against recognized standards.

WSTF maintains an 18,000 square foot precision machining and fabrication facility with expert machinists and welders, each with over 20 years of experience. The fabrication team is skilled in working with exotic metals like Monel®, Inconel®, titanium, carbon, and alloy steels. With precision

machining and welding capabilities, the facility produces flight hardware, ground support equipment, and facility and test hardware. WSTF also has highly automated, computer numerically controlled milling and turning capabilities.

Component service operations consist of hardware precision cleaning, component assembly, and component calibration. Extensive cleaning and refurbishing experience with numerous valve configurations, metal types, and elastometrics is provided via a full-service clean room and valve shop.

WSTF Flight and Critical Hardware Processing employs a small team of highly skilled engineers and technicians with nearly 500 years of combined technical expertise in the processing, development, and qualification of flight hardware. The Hardware Processing Office now includes a Flight Cable Manufacturing Facility capable of fabricating flight-qualified electrical cables and cable harness assemblies.

WSTF maintains several clean rooms and large areas that can be used for test article assembly and checkout. These areas range from Class 100 clean rooms and flow benches to large size assembly areas. <http://www.nasa.gov/centers/wstf/home/index.html>

Emerging Technology Ventures (ETV) has been selected by the SBA for funding for one of four new regional innovation cluster contracts. The State of New Mexico and City of Alamogordo have also provided funding for the project. ETV is renovating an 85,000 square foot facility. The SBA funding will help ETV strengthen opportunities for small businesses within the cluster by providing mentoring, counseling and programming to assist them in showcasing and pitching both the public and private sectors on the technology they develop. These technologies can then be marketed to local defense installations, such as White Sands Missile Range and Holloman Air Force Base, the U.S. Air Force's training command for unmanned aerial vehicle parts.







## UNITED STATES AIR FORCE PRESENCE

### Cannon Air Force Base, Clovis

Cannon Air Force Base is home to the 27th Special Operations Wing. The base is eight miles west of Clovis and totals 3,789 acres. The Melrose Air Force Range training area is located approximately 25 miles west of Cannon and is approximately 70,000 acres. Operations on Melrose Range cover an area of 2,500 square miles of airspace. Melrose AF Range is used for training such as air to ground, small arms, and electronic combat. Nearly 6,000 military and civilian personnel make up the workforce at Cannon.

The 27th Special Operations Group is one of four groups assigned to the 27th Special Operations Wing. The group accomplishes global special operations tasking as an Air Force component member of the United States Special Operations Command. It conducts infiltration/exfiltration, combat support, helicopter and tilt-rotor aerial refueling, psychological warfare, and other specials missions. It directs the deployment, employment, training, and planning for squadrons that operate the AC-130W, AG-130H, PC-12, Q-200, M-28, CV-22, and other aircraft, and provides operational support to flying operations. There are three squadrons, three tenant units and one detachment within the group. <http://www.cannon.af.mil/>

### Holloman Air Force Base, Alamogordo

Holloman AFB was originally established in 1942 as Alamogordo Air Field and renamed for Colonel George Holloman in 1948. It is six miles west of Alamogordo and 59,639 acres. Holloman supports about 21,000 Active Duty, Guard, Reserve, retirees, DoD civilians and their family members.



Present aircraft flown at Holloman: F-22A Raptor, T-38 Talon, MQ-1 Predator, MQ-9 Reaper, QF- 4 Drone, F-4 Phantom II, and German Air Force Tornado. Holloman is home to the world's longest (50,788 feet, or almost 10 miles) and fastest (approaching 10,000 feet per second, Mach 9) test track. The 846th Test Squadron set the world land speed record for a railed vehicle with a recent run of 6,453 mph, or Mach 8.5.

Personnel from Holloman have participated in numerous operations and conflicts such as: Operation Desert Shield/Desert Storm, Operation Allied Force, Operation Southern Watch, Operation Northern Watch, Operations Enduring Freedom, Operation Iraqi Freedom, and many more.

The 49th Wing – host wing at Holloman – supports national security objectives by deploying worldwide to support peacetime and wartime contingencies. The wing provides combat-ready Airmen and trains MQ-1 Predator and MQ-9 Reaper pilots and sensor operators. <http://www.holloman.af.mil/>

#### Kirtland Air Force Base, Albuquerque

Kirtland Air Force Base is in southeast Albuquerque and is home to the Defense Threat Reduction Agency Albuquerque office, the Air Force Safety Center, the Air Force Inspection Agency, the Air Force Operational Test and Evaluation Center, the 58th Special Operations Wing, Space Development and Test Directorate, the New Mexico Air National Guard 150th Wing, the Directed Energy and Space Vehicle Directorates of the Air Force Research Laboratory, the Department of Energy Albuquerque Office, the National Nuclear Security Administration and Sandia National Laboratories.

The U.S. Air Force Safety Center's Remotely Piloted Aircraft (RPA) Safety Branch is dedicated to substantially reducing RPA mishap rates by developing RPA safety solutions and providing commanders the ability to thoroughly investigate and prevent mishaps without negatively impacting combat operations. The RPA Safety Branch has also taken a lead role integrating RPA's into the National Airspace System. The RPA Safety Branch is taking a proactive approach to preserve combat capability through focused policy, guidance, risk assessment, analysis, and investigations.

Flying operations at Kirtland AFB share the flightline, runways and airspace with commercial aviation at the Albuquerque Sunport. <http://www.kirtland.af.mil/>

## INDUSTRY RESEARCH AND TECHNOLOGY DEVELOPMENT

Space Vehicles Research Facilities Air Force Research Laboratory (AFRL) at Kirtland Air Force Base, Albuquerque

The Air Force Research Laboratory Space Vehicles Directorate develops and transitions space technologies to provide space-based capabilities. Primary mission area thrusts include space-based intelligence, surveillance and reconnaissance, space situational awareness, space communications, position navigation and timing, and defensive space control (protecting space assets from man-made and natural effects). The directorate also leverages commercial, civil and other government resources to stay one step ahead in space and to ensure America's advantage.

The Aerospace Engineering Facility is a 16,500 square-foot facility that includes a 60-foot tall, 4,500 square-foot high-bay laboratory for assembly testing of space flight hardware, including an overhead rail system with two 7.5-ton cranes. The facility includes a 600 square-foot, class- 100 clean room, a class-10,000 clean tent, three environmental chambers, a thermal vacuum chamber, three vibration tables, a copper screenroom for electromagnetic testing and a machine shop for hardware fabrication.

The Battlespace Environment Laboratory is a 145,000 square-foot laboratory that includes high-vacuum environments, environmental calibration, chemistry and spectrometry, computer modeling, processing of space data, space operations, remote sensing and quantum computing.





The Distributed Architecture Simulation Laboratory (DASL) is a 1,500 square-foot state-of-the-art modeling and simulation laboratory. It is an open storage facility capable of supporting both unclassified and classified system simulations. The DASL is a modular, human-and-hardware in the loop, end-to-end system simulation testbed capable of evaluating technology models, hardware and space experiment mission software. The DASL operates interactively in real or regimented time and can perform both parametric and “Monte Carlo” evaluations. The Data Center warehouses both simulation and experimental data and supports information mining by on-site and remote customers. Recent upgrades include 48 core clusters used to support modeling and simulation and a modernized audio-visual display system. The DASL served as the focal point for space during the 2009 Advanced Concept Event exercise.

The Spacecraft Component Laboratory contains a 7,500 square-foot composites-fabrication laboratory, a machine shop with various prototyping equipment (including computer controlled machining), a 2,200 square-foot room with multiple ovens and autoclaves, an 800 square-foot materials testing laboratory, an 8,600 square-foot space structures-testing laboratory with large-scale static load frames, a 2,000 square-foot photovoltaic laboratory and a Responsive Space Testbed, a facility where contractors can bring Plug-and-Play (PnP) technologies to try them out with other PnP systems.

The Integrated Experiments and Evaluation Division works to develop and integrate ground, space, and near-space experiments designed to assess and prove emerging technologies and concept of operations for military space applications. This is facilitated by modeling simulation, technical analysis, and military utility assessment, as well as robust satellite integration and testing.

Other laboratories within the Space Vehicles Directorate at AFRL include Infrared Radiation Effects, Microelectronics Test and Measurement, Photovoltaic, Radio Frequency/Microwave, Spacecraft Component Thermal Research, and the Radiation Hardening Test Facility. (Source: AFRL's Directed Energy and Space Vehicles Directorates Resources Guide). [http://www.kirtland.af.mil/afrl\\_vs/index.asp](http://www.kirtland.af.mil/afrl_vs/index.asp)

Configurable Space Microsystems Innovations & Applications Center (COSMIAC) at the University of New Mexico, Albuquerque

COSMIAC promotes aerospace innovation through the reliable and responsible use of configurable technology in military and aerospace systems by serving the interests of industry, government, and academia. COSMIAC's three primary thrusts include R&D, workforce development and outreach.

COSMIAC at UNM built Trailblazer, a CubeSats satellite, was manifested and launched in 2013 on the Operationally Responsive Space (ORS) ORS-3 launch from Wallops, Virginia. Trailblazer's three missions are to provide proof of concept to SPA, provide flight heritage and receive radiation exposure measurements from a dosimeter (designed by COSMIAC in partnership with the Air Force Research Lab), and to provide a space qualification platform for an additive manufacturing technology designed by the University of Texas El Paso (UTEP). All of these goals have key components for advancing the missions of NASA:

- The first was to perform a flight test on open-source satellite bus architecture. This project advances space technology by providing low-cost, efficient development and integration technologies that are a large improvement over current approaches.
- The second was a dosimeter developed by the Air Force Research Laboratory, in partnership with COSMAIC, and the third was a 3D circuit board developed by the team at the University of Texas at El Paso. <http://www.cosmiac.org/>





### The Very Large Array (VLA), Datil, New Mexico

The Very Large Array, one of the world's premier astronomical radio observatories, consists of 27 radio antennas in a Y-shaped configuration on the Plains of San Agustin 50 miles west of Socorro (New Mexico). Each antenna is 25 meters (82 feet) in diameter. The data from the antennas is combined interferometrically to give the resolution of an antenna as much as 36 kilometers (22 miles) across, with the sensitivity of a dish 130 meters (422 feet) in diameter. The results are maps of radio frequency energy sources on the sky that are analogous to optical images.

Radio waves of various wavelengths are produced by many different astronomical processes, and can penetrate dust clouds that are opaque to visible light. Thus, vast and very productive areas of astronomical research are enabled by the facility.

Constructed in 1975, the VLA is used by astronomers around the world and is occasionally used for atmospheric/weather studies and satellite tracking. [www.vla.nrao.edu/](http://www.vla.nrao.edu/)





## Sandia National Laboratories (SNL), Albuquerque

Sandia is a government-owned/contractor operated facility. Sandia Corporation, a Lockheed Martin company, manages Sandia for the U. S. Department of Energy's National Nuclear Security Administration. Sandia's mission falls into five areas:

- Nuclear Weapons
- Energy & Climate
- Defense Systems & Assessments
- International, Homeland, & Nuclear Security

Sandia has more than 25 years of established space technologies and expertise. SNL is part of a national team developing the Precision Tracking Space System (PTSS), an alternative approach for detecting and tracking dim targets.

Sandia's Radar Fuzing Department falls under the Nuclear Weapons' directorate and designs and produces Arming and Fuzing Subsystems (AFS). The AFS is a highly integrated assembly that performs the missile interface, programmer, re-entry sensor, data multiplexer, and radar functions.

The Aegis Readiness Assessment Vehicle (ARAV) team was presented with the 2010 David Packard Excellence in Acquisition Award by Hon. Ashton Carter, undersecretary of defense for acquisition, technology, and logistics, in recognition of its innovative acquisition practices in building, integrating, and launching eight ballistic missile targets, including a new vehicle that allows the U. S. to test against complex, realistic countermeasures. The ARAV team sought to build and launch a cost-effective family of high fidelity ballistic missile targets. The resultant ARAV-As and -Bs are more than 85 percent less costly than the targets they replaced.

The Key Data Processor (KDP) is a Sandia-designed cryptographic engine at the heart of each Selective Availability Anti-Spoofing Module GPS receiver. The module decrypts GPS satellite transmission and grants access to military signals and data for increased precision and signal authentication.

Sandia developed a next-generation optical sensor that was launched on a Global Positioning System satellite in 2010. The sensor is designed to detect atmospheric and space nuclear detonations.

Located in Sandia Tech Area 4, the Nuclear Detonation Detection System (NDS) Analysis Package (NAP) Ground System is a unique, autonomous earth station capable of tracking and capturing telemetry data from multiple NAP-equipped GPS satellites simultaneously.

The Center for Integrated Nanotechnologies (CINT) is one of five Nanoscale Science Research Centers sponsored by the U. S. Department of Energy. The core facility is at SNL and the gateway facility is at Los Alamos National Laboratory. CINT focuses on four scientific areas:

- Nanoscale Electronics & Mechanics - Control of electronic transport and wave functions, and mechanical coupling and properties using nanomaterials and integrated structures.
- Nanophotonics & Optical Nanomaterials - Synthesis, excitation and energy transformations of optically active nanomaterials and collective or emergent electromagnetic phenomena (plasmonics, metamaterials, photonic lattices).
- Soft, Biological & Composite Nanomaterials - Solution-based materials synthesis and assembly of soft, composite and artificial bio-mimetic nanosystems.
- Theory & Simulation of Nanoscale Phenomena - Assembly, interfacial interactions, and emergent properties of nanoscale systems, including their electronic, magnetic, and optical properties.  
<http://cint.lanl.gov/>

The SNL Manufacturing Enterprise is a 70,000 square foot shop and lab space facility with over 120 tradepersons and support personnel who work with your engineers to transform ideas into working prototypes. Services provided include:

- Machining
  - o Heavy machining: Machines with capacity of 50,000 pounds and 84 inches long
  - o Project machining: Machining services and project management
  - o Rapid turnaround: Rapid response to manufacturing needs
  - o Miniature machining: Microscopic machining
  - o Composite machining, grinding, & polishing: Machining of non-metals
  - o Explosive processes: Explosives machining by remotely operated equipment
- Manufacturing Liaison: Electronic and mechanical liaison groups work with inside shops and over 2,000 outside suppliers
- Welding, Fabrication, & Assembly: Onsite or remote welding, assembly, and repair
- Precision Metal Forming: Aircraft quality sheet metal fabrication
- Heat Treatment: Hardening, normalizing, annealing
- Machine Repair: Preventative maintenance and repair of machine shop equipment
- Abrasives: Grinding and lapping of materials
- Mechanical Measurements: In-process and final dimensional measurements of components
- Calibration: Length, mass, force, and dimensional reference standards

[www.sandia.gov](http://www.sandia.gov)

## Los Alamos National Laboratory (LANL), Los Alamos

LANL is located 35 miles northwest of Santa Fe, employing more than 10,000 with an annual budget of more than \$2 billion. The Laboratory is operated by Los Alamos National Security, LLC (LANS), a team composed of Bechtel National, Inc., the University of California, the Babcock & Wilcox Company, and URS Energy and Construction, Inc, for the Department of Energy's National Nuclear Security Administration. From LANL's inception it has provided cutting edge research to the aerospace industry.

Three LANL technologies are aboard the Mars Science Laboratory mission's Curiosity rover, which set down on the surface of the Red Planet in August 2012.

TAOS is the follow-on to the AngelFire system, an airborne image surveillance method developed at LANL and used in Iraq to provide imagery-based surveillance to ground forces. <http://lanl.gov/>





## EDUCATION AND WORKFORCE DEVELOPMENT

The strong aviation industry presence means there is a skilled and experienced workforce for new businesses. New Mexico has several colleges that offer technical certificates as well as more advanced degrees. The state's Job Training Incentive Program is one of the most aggressive workforce programs in the country.

**Central New Mexico Community College (CNM)**  
Central New Mexico Community College (CNM) offers three certificates/degrees under Aviation Technology:

- Airframe Maintenance Technician, Certificate of Completion
- Power plant Maintenance Technician, Certificate of Completion
- Aviation Maintenance Technology, Associate of Applied Science

<http://www.cnm.edu/>

**Eastern New Mexico University – Roswell (ENMU-R)**  
Eastern New Mexico University – Roswell offers both an associate's degree and a Certificate of Completion in Aviation Maintenance Technology.  
<http://www.roswell.enmu.edu/>



## UNM Aerospace Institute

The University of New Mexico's Aerospace Institute was founded in 2009 to serve as a statewide clearinghouse for aerospace technology development, economic development, education, and training. As an example, more than 700 individuals have been taught Space-Plug-and-Play (SPA) architecture through UNM and its partners in the last 24 months.

Aerospace Engineering falls under UNM's School of Engineering and is currently offering classes in the following fields:

- Dynamics & Controls
- Fluids
- Manufacturing Engineering Program
- Plasma & Space Weather
- Space Communications
- Structures

<http://unmaerospace.unm.edu/education.html>





The Step Up Program is an aspect of JTIP that serves incumbent employees and their employers through training and reimbursements. Training and development results in new knowledge and skills in the workforce that increases employee engagement, satisfaction, and loyalty. A well trained and developed workforce reduces costly turnover and delivers higher performance for the business.

Qualified companies in New Mexico that participate in the program will be reimbursed up to 75% of the cost to provide training for current employees up to \$2,500 per employee. The program covers a variety of training from custom management and supervisory training offered by a local college to industry-specific trainings in other cities.

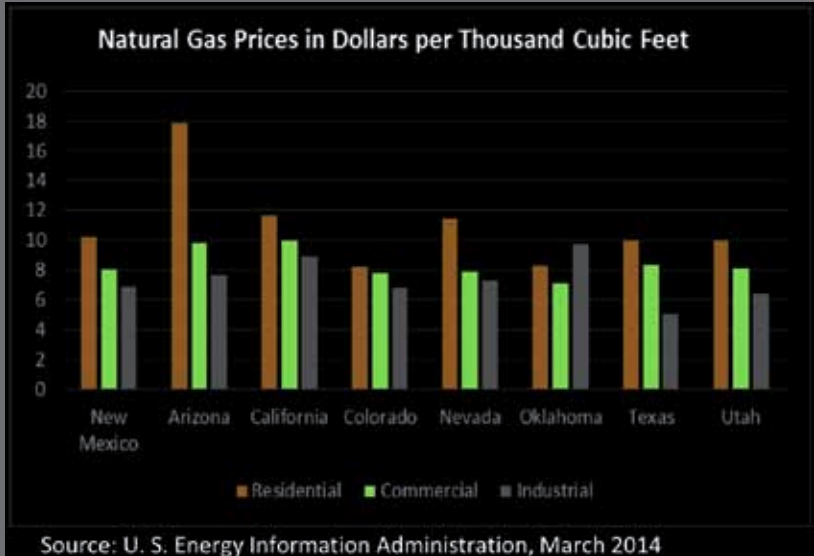
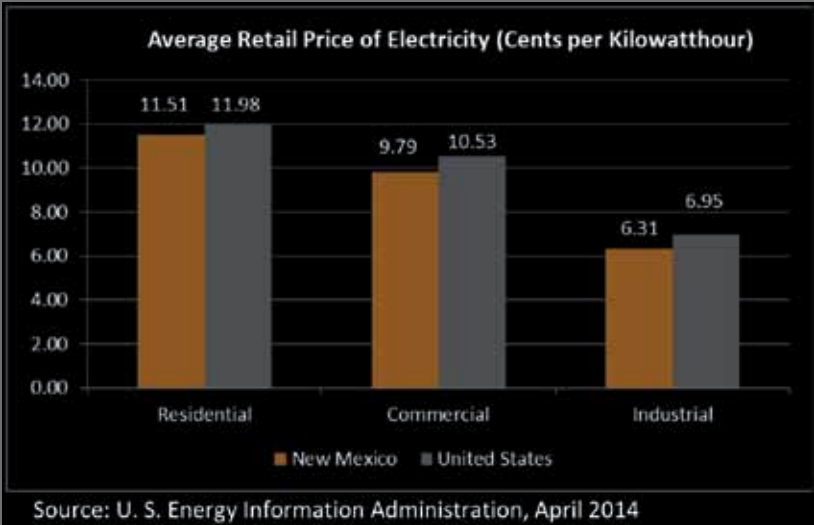


COMPETITIVE ELECTRIC POWER AND NATURAL GAS PRICES

New Mexico generates about 2.7 times the amount of total energy consumed statewide. Consequently, New Mexico is a large net exporter of energy to Arizona, California, Utah, and Texas. This translates into competitively-priced electricity.

According to the Department of Energy, New Mexico's energy cost was 7% below the national average in 2013 – one of the lowest in the southwest.

The New Mexico Public Utility Act allows both investor-owned and electric cooperatives to offer a discounted economic development rate to a customer for four years with the possibility of extending it one more year, to a total of five years.



The state's largest electric utility provider is Public Service Company of New Mexico (PNM). PNM has repeatedly been rated one of the most reliable electric utilities in the nation, with a reliability rating of over 99.99% over the past several years. PNM has some of the lowest electric rates in the Southwest, offering an important competitive advantage to businesses that use a large amount of electricity.

Xcel Energy serves the majority of eastern New Mexico. Commercial utility rates are among the lowest in New Mexico and the Southwest. Xcel consistently ranks high in reliability indices published by the New Mexico Public Regulation Commission.

Southern New Mexico is primarily served by El Paso Electric (EPE). EPE has a net dependable generating capability of 1,795 MW and is ranked extremely high in reliability in both New Mexico and Texas.

Sixteen rural electric distribution cooperatives as well as two generation and transmission cooperatives serve approximately 200,000 families and businesses in New Mexico. They are established as member-owned and controlled cooperatives, delivering efficient and reliable service.

All of these utility providers serve as strong economic development partners working with stakeholders to ensure a relatively inexpensive and highly reliable service is provided to relocating and growing businesses.





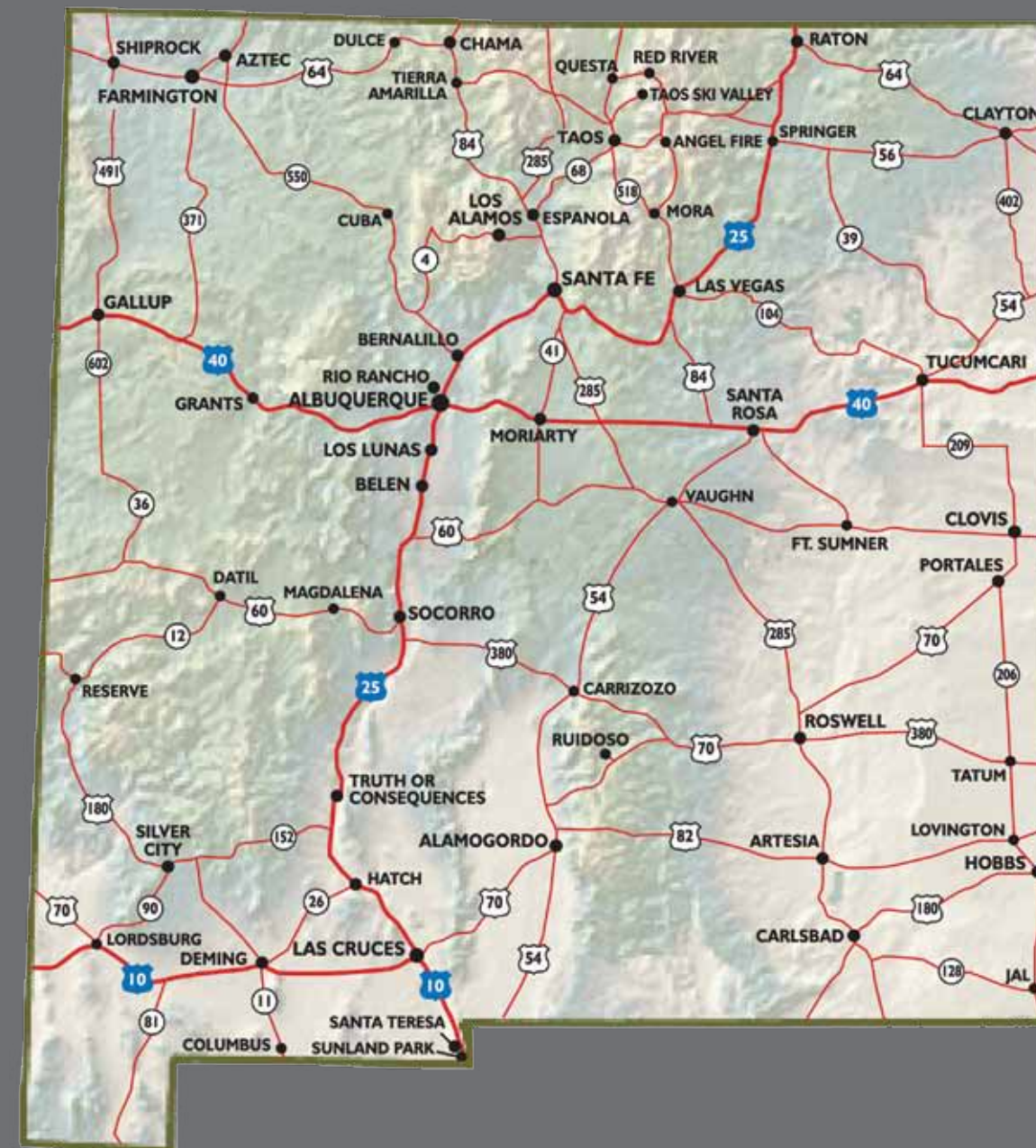
## TRANSPORTATION INFRASTRUCTURE

New Mexico is strategically located in the rapidly-growing Southwest. An excellent highway and rail infrastructure provides direct access to the east and west coasts, Texas, the midwest, and the international borders of Canada and Mexico.

From New Mexico goods can be delivered to Texas, Arizona, Colorado, Kansas, and Utah within one day, and California markets in two days. The volume of truck traffic into the state translates into low backhaul rates for goods leaving the state.

Union Pacific serves 25,000 customers in 23 states across the western two-thirds of the U.S. — a total of 31,900 route miles. The railroad has a \$400 million, 2,200 acre intermodal facility near the Santa Teresa International Port of Entry to Mexico. The new facility is located just west of the Santa Teresa Airport and includes fueling facilities, crew change buildings, locomotive inspection tracks, an intermodal ramp, a switching yard, and 200 miles of track. Santa Teresa is halfway between the ports of Long Beach and Houston.

Burlington Northern (BNSF) serves 28 states and two Canadian provinces – a total of 32,500 route miles. It operates a multimodal rail yard in Belen, 30 miles south of Albuquerque. The railway is investing \$68 million on a double-track project in New Mexico, which is expected to be in service in mid-2015. BNSF is also investing approximately \$1.1 billion on locomotive, freight car, and other equipment acquisitions, many of which will serve New Mexico.







More than 60 airports are located throughout New Mexico. Two international airports serve the northern and southern regions of the state:

- Albuquerque International Sunport provides nonstop service to 23 cities daily via eight commercial carriers. Two cargo carriers serve the airport: Federal Express and UPS.
- El Paso International Airport is served by five commercial carriers with nonstop service to ten cities. It is served by four cargo carriers: Federal Express, UPS, DHL and C&M Airways.

Four regional airports offer commercial air service:

- The Santa Fe Municipal Airport is served by both American and United Airlines. American provides nonstop service to Dallas-Fort Worth and Los Angeles. United provides daily nonstop service to Denver.
- Boutique Air offers direct service between Clovis and Dallas-Fort Worth and between Albuquerque and Silver City.
- Lea County Regional Airport, in Hobbs, is served by United with daily flights to Houston.
- Four Corners Regional Airport in Farmington is served by Great Lakes Airlines, a code share partner for United Airlines. Service is available to Denver and Alamosa Colorado, and to Phoenix and Show Low, Arizona.





## HISTORY OF SPACE IN NEW MEXICO

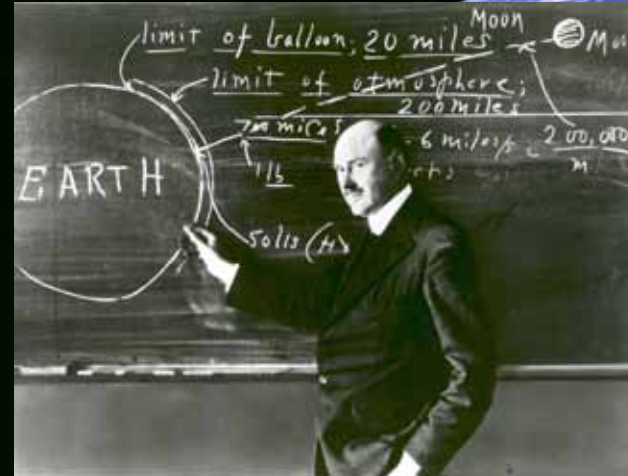
Around 1054 A.D. Native Americans drew petroglyphs depicting the supernova explosion that created the Crab Nebula on the stone walls of Chaco Canyon, New Mexico.

Fast forward to the 20th century, 1929, Robert Goddard, the “Father of Modern Rocketry,” relocates to Roswell to build and test rockets. Clyde Tombaugh also discovered Pluto in 1929 and went on to become a revered astronomy professor at New Mexico State University.

In 1945 White Sands Proving Ground (now White Sands Missile Range) was established near Las Cruces. One year later New Mexico became the official birthplace of the space age in the United States when Wernher von Braun successfully launched the V2-Rocket into space from White Sands.

In 1947 a U. S. Air Force press release announced that a UFO had landed outside Roswell. Hours later the press release was retracted, but what became known as the “Roswell Incident” lives on in legend.

In 1975 the Very Large Array was constructed near Magdalena, New Mexico.



In 1982 the Space Shuttle Columbia landed at White Sands.

During the decade between 1992 and 2002 the idea that would eventually become Spaceport America was developed and refined.

In 2005 the State of New Mexico and Sir Richard Branson identified the location of Spaceport America near Truth or Consequences, New Mexico. Virgin Galactic has located its world headquarters at the Spaceport.

2015: More than 50 aerospace and aviation companies call New Mexico home.

Sources: The information provided in this document was taken from the web sites of each entity.







## LIFESTYLE

Few places on earth offer the rich history and cultural diversity found in New Mexico. Native American culture has been present in the state for more than 2,500 years, and is home to 22 Native American tribes. Their rich history is celebrated today in museums, ceremonial dances, arts and crafts, language, and traditional villages. Visitors can celebrate on the pueblos year round during designated feast days, and partake in native homemade cuisine and tradition. The annual SWAIA Santa Fe Indian Market is held the 3rd weekend in August and features more than 1,000 Native artists.

Chaco Culture National Historic Park dates to 850AD and is considered the most exceptional concentration of pueblos in the American Southwest. It is one of only 20 World Heritage sites in the U.S. Chaco is probably the best representation of the first art ever created in New Mexico. Follow the Trail of the Ancients to visit more historic and cultural sites in the Four Corners.

Spanish colonial culture arrived in the state in the late 1500's, contributing over 500 years of Hispanic influence to the New Mexican way of life. The Annual Traditional Spanish Market displays this influence through food and art in Santa Fe during the summer and in Albuquerque during the winter. The combination of Native and Hispanic elements results in a strong culture found in every aspect of the state from food and fiestas to architecture and art.

The Taos Art Colony and Taos Society of Artists began in 1898 when Ernest L. Blumenschein and Bert Geer Phillips broke a wagon wheel while headed to Mexico to sketch and paint. Both eventually made Taos home and would be joined by many others in the years to come. Taos is still the residence of many talented artists. New Mexico is known as The State of the Arts because it is home to more working artists, open studios, artist-owned galleries, and specialty and artisan-oriented shops than any other state per capita. Visitors can schedule studio tours, which is a great way to explore New Mexico by finding new and traditional art, meeting the artists, and eating local food.

While local events are common, New Mexico has just the perfect environment to host international events every year. Every visitor, no matter where they are from, will find the relaxed lifestyle charm-



ing and endearing, while also experiencing other worlds at their fingertips. The Santa Fe International Folk Art Market is the largest of its kind bringing in cultures from more than 40 countries for over 20,000 visitors to experience at the height of New Mexico's beauty in the summer. Other colorful events include the Roswell UFO Festival, the Great American Duck Race in Deming, the Lincoln County Cowboy Symposium, and Whole Enchilada Festival in Las Cruces.

Visitors are also drawn to the state's many historical sites, museums, and celebrations every year. The State of New Mexico operates eight museums covering a range of interests, from Space History to Folk Art. There are over 40 museums, and hundreds of art galleries throughout the state covering anything from local artisan art to globally-known fine art. Summer is the season for art in New Mexico, including performance art. Thousands come to New Mexico for the Santa Fe Opera season in the world-renown venue that is like no other. The annual Blues Festival held Memorial Day weekend each year draws hundreds of blues enthusiasts to Silver City, a beautiful town in the Gila Wilderness with its own rich history and, today, home to many art galleries. New Mexico's beautiful historic theaters offer a variety of performing arts, symphonies, chamber music, concerts, and plays.

For those who want to experience the beauty of nature, the state operates 36 parks, 3 national parks, and 12 national monuments. The most famous of these is Carlsbad Caverns National Park, with some of the largest underground caves and chambers in the world. During the summer, stay until



dusk and watch as nearly 400,000 bats fly out of the cave for their evening adventure. Nearby Lechguilla Cave, explored to depths of 1,593 feet, is the nation's deepest cave, and the Gila Wilderness, an area of mountainous beauty and ancient cliff dwellings, was the first wilderness area to be so designated by Congress. Viewers will be struck by White Sands National Monument, which is 275 square miles of pure white sand.

Hiking and biking trails are for you to discover from Angel Fire to Las Cruces, or you can rock climb in Diablo Canyon or see the natural sights at Tent Rocks near Cochiti Pueblo. After a long day of outdoor activity, soak in any one of the hot mineral springs throughout the state in Jemez Springs, which offers both hot and cool, primitive and luxurious pools; Truth or Consequences, whose springs heat up to 115 degrees Fahrenheit; or the 145 year-old Ojo Caliente Mineral Springs, which are known for their healing powers.

Boating on any of the 20 lakes in our state parks from Elephant Butte in the south to Navajo Lake in the northwest is a great way to enjoy the fresh air and beautiful scenery, and the quality trout waters of the San Juan River are well known to fly fishermen everywhere. Go rafting or kayaking in any one of New Mexico's rivers, totaling 200 miles of waterway, or dive into the Blue Hole in Santa Rosa, a natural 80 foot deep pool, for scuba diving.



Or if you'd rather take a day trip, nearly any town you visit has its own story of life in the wild 'old west' and getting there is an experience in itself. This is especially true of the many ghost towns you may encounter along any one of New Mexico's 25 magnificent scenic byways, which equal over 2,900 miles across a diverse landscape. You can follow one of these paths to take a tour of Georgia O'Keefe's Ghost Ranch in Abiquiu, then visit the museum dedicated to her life and work in Santa Fe. You can also follow the Film Trails and tour the scenes from films and television shows made in New Mexico.

New Mexico hosts all four seasons and fall is one of the most beautiful. The smell of roasting chile in the air, the taste of freshly picked and roasted pinon, and the golden sight of the aspen leaves changing colors on the mountain tops bring warmth to you as the breeze turns cooler. Fall is also a season for fiestas! The International Balloon Fiesta attracts visitors from all over the world to see the Albuquerque sky decorated with colorful and special-shaped hot air balloons. Santa Fe kicks off the harvest season with Fiestas de Santa Fe and continues the celebration with the Wine and Chile Festival, Hatch hosts their chile festival, and the Whole Enchilada Fiesta in southern New Mexico. This is the 3rd largest event in the state and one of the top 100 events in the nation.

From the stark, arid beauty of southern New Mexico's deserts to some of the country's finest ski slopes located on over 20 mountain ranges, this land of breathtaking contrasts offers a myriad of outdoor activities year-round. Each season New Mexico slopes average 300 inches of snow, the Kachina lift at Taos Ski Valley is one of the highest in North America, and Angel Fire is the only New Mexico resort with night skiing. If you are not a skier, there are plenty of other snow activities inner tubing, snowshoeing, snowmobiling, sleigh rides, ice fishing, and ice skating.







505 827 0300 . [WWW.GONM.BIZ](http://WWW.GONM.BIZ)